

**METHOD AND APPARATUS FOR FILTERING DATA  
CONCERNING AN ELECTRONIC PROGRAM GUIDE  
FOR A TELEVISION RECEIVER**

**Field of the Invention**

The invention generally relates to television receivers or sets, and more particularly to TV sets equipped with a device for receiving information or data concerning programs of channels and displaying them on the TV screen at the viewer's request.

**Background of the Invention**

A TV image or video image includes two interlaced fields of lines, and the time interval which runs between the end of one field and the start of the next, referred to as the field flyback (or vertical flyback), is devoid of video signals. Accordingly, it has been proposed to use this field flyback to send information, for instance "teletext" information. It has been proposed to use these time intervals to send the programs of certain channels as well as to produce an electronic guide to the programs on these channels, known under the acronym EPG for Electronic Program Guide.

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This electronic program guide is sent in two parts, SUMMARY and CONTENTS, the SUMMARY identifying each channel by a code CNI (for Country Network Identification) and indicating, for each channel, references or ID numbers identifying blocks of data whose contents relate to the program of the corresponding channel. These ID references are classed in an ascending order and identify, for example in the form of a pair of ID references, the first data block and the last data block allocated to a channel of the SUMMARY. This pair defines a series of identification numbers for each channel.

Presently in France, two channels propose such a guide not only for their own programs, but also for programs of other channels, for instance those in the French language. Such a service could moreover be supplied by each channel for other channels. To supply such a service, the TV set must be equipped with a device which includes a memory storing the information received during the field flyback and concerning the electronic program guide. This memory is then "managed" by programs and algorithms in view of presenting the information according to criteria defined by the viewer, e.g. the programs on a given channel, films shown on the channels at a given date, etc.

It has been determined that the size of the memory needed to record the program of a channel over one week is about 256 kilobytes, i.e. two to three megabytes for around ten channels. This size is without counting the microprocessor memory for processing the information in view of presenting it

according to selected criteria. These figures show that the size of the memory limits the service which can be proposed to a TV viewer in that area.

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### Summary of the Invention

An object of the present invention is, therefore, to implement a method and provide a device for filtering information received to retain only that which presents an interest to the TV viewer according to certain criteria, allowing an adaptation to the size of the memory.

The invention relates to method of filtering data concerning an electronic program guide in a television receiver and sent in the form of a SUMMARY and CONTENTS. The television receiver may comprise a device for automatically searching television channels and supplying a list of codes CNI for all or some of the channels received by the television receiver to a first memory. The method includes obtaining in a second memory, from the SUMMARY of the guide, a MODIFIED SUMMARY containing only the information of the SUMMARY concerning all or some of the channels received by the television receiver as identified in the first memory, and recording only the data blocks of the CONTENTS of the guide in a third memory when they correspond to all or some of the channels received by the television receiver.

Obtaining the MODIFIED SUMMARY may include recording the SUMMARY or a part thereof in a buffer memory, at each field flyback; comparing each code CNI of the SUMMARY with the list of codes CNI contained in the first memory; transferring the received code CNI

and the identification numbers of the associated data blocks into the second memory only in the case of identity so as to create the MODIFIED SUMMARY; then processing the next code CNI or recording the SUMMARY.

5 Recording data in the third memory may include recording at least one data block and its identification number ID in the buffer memory; comparing the identification number ID of the data block with the identification numbers ID recorded in  
10 the second memory; transferring the data block, its identification number ID as well as the corresponding code CNI into the third memory only in the case of identity; and processing the next identification number or recording the data block(s) of the next field.

15 The invention also relates to a device for filtering data concerning an electronic program guide (EPG) in a television receiver including a device for automatically searching channels and supplying a list of codes CNI of all or some of the channels received by  
20 the television receiver to a first memory. The device may also include a buffer memory for recording the information concerning the electronic program guide EPG received during a field flyback of the television image; and a third memory for recording, via the buffer  
25 memory, the information of the EPG guide. The device also includes a television screen for displaying the television pictures as well as information of the EPG guide, and a microcontroller for supplying command signals for commanding the buffer memory and the third  
30 memory.

Furthermore, the filtering device may comprise first comparison means for comparing each code

CNI of the SUMMARY of the EPG guide with the list of codes CNI of all or some of the channels received by the television receiver, as recorded in the first memory; and means, controlled by the comparison means, 5 for recording in a second memory the codes CNI of all or some of the received channels as well as numbers ID identifying the data blocks corresponding to each program of the received channels. A second comparison means compares each identification number ID of a 10 received data block with the list of identification numbers recorded in the second memory. Means, commanded by the second comparison means, records the data blocks for which the identification numbers ID correspond to those recorded in the second memory as 15 well as the code CNI of the channel and the identification number ID of the data block in the third memory.

#### **Brief Description of the Drawings**

20 Other characteristics and advantages of the present invention shall become more apparent upon reading the following description of a preferred embodiment, given in conjunction with the appended drawings in which:

25 Fig.1 is a simplified schematic diagram of a device for filtering television channel program data in accordance with the invention.

Fig.2 is a flowchart showing the steps involved in processing an EPG guide SUMMARY in 30 accordance with the invention.

Fig.3 is a flowchart showing the steps involved in processing EPG guide CONTENTS in accordance with the invention.

5        **Detailed Description of the Preferred Embodiments**

As discussed above, information concerning channel programs are sent during the field flyback to form the electronic program guide known under the acronym EPG. In Europe, the information is defined by  
10       the ETS 300-307/708 standard (ETS is the acronym for European Telecommunications Software). For the requirements of the present invention, the description of that standard shall be limited to those elements that are essential for its understanding.

15       The contents of an EPG guide comprise two parts: a first part referred to as "SUMMARY", and a second part referred to as "CONTENTS". The SUMMARY contains at least the CNI identification (CNI is the acronym for Country Network Identification) of the  
20       channels covered by the guide, each accompanied by two references or ID numbers which identify, in the CONTENTS part, the first and last data blocks whose data relate to the channel identified by the CNI code. These pairs of numbers of the first and last data  
25       blocks define a series of consecutive numbers. As a variant, the invention also applies to the case where all the identification numbers of the data blocks allocated to a channel are sent in the SUMMARY.

An EPG guide transmission first starts with  
30       the SUMMARY followed by the CONTENTS, this transmission being performed field after field at a rate of around 700 bytes at the most per field. Consequently, the

transmission of the SUMMARY or a data block can use several field flybacks, which implies that there are also elements which identify each field flyback. In present-day EPG guide systems, the SUMMARY is recorded  
5 in a memory to serve as switching information for the data blocks in the CONTENTS and for allocating data blocks to the corresponding channels by comparing the number of a received data block with the pairs of numbers of first and last blocks accompanying the CNI  
10 code of each channel in the SUMMARY.

These data blocks are recorded when they are received in a memory by associating them with the corresponding CNI code so that programs and algorithms will make it possible to present the recorded data  
15 blocks on the television screen according to determined criteria. Note that the transmission of an EPG guide can take up several tens of minutes of transmission time. In view of the limited memory capacity, it may happen that the last received data blocks cannot be  
20 recorded even though the information they contain is of interest to the viewer.

In accordance with the invention, it is proposed to filter the received data blocks so as to record, according to certain criteria, only those that  
25 correspond to channels of interest to the viewer. One principle filtering criterion, in accordance with the invention, is to focus only on channels that are received by the TV set. Naturally, other criteria may be used, for instance the channels in a given language,  
30 so long as the channels are listed in the SUMMARY according to that criterion. However, this language criterion can be preceded or followed by the criterion

of whether or not the channel is received by the TV set.

The criterion of whether or not a channel is received is easy to implement since this information is created upon the TV set being set up at the level of the viewer. Indeed, each TV set is equipped with an automatic channel searching device which, by scanning through the frequency spectrum, can automatically recognize the channels susceptible of being received at the TV set's geographical location and record their identification characteristics, including the CNI code. This operation is known as tuning. These identification characteristics are recorded in an EEPROM (electrically erasable programmable read-only memory) type semi-permanent memory.

In the simplified diagram of Fig.1, the TV signal is detected by an antenna **10** and directed to a receiver **12**. At the output of the receiver **12**, a first signal is applied to a processor device **36** which displays the image on the screen or display **14**. A second signal is applied to an automatic channel search device **38** which detects the channels via a circuit **16** and records the identification characteristics of these channels (CNI codes) in a first memory **18** mentioned above.

A third signal, which is the one transmitted during the field flyback, is applied to a demodulator circuit **20** which supplies binary codes in accordance with the above-mentioned standard. These binary codes are recorded in a buffer memory **22** whose capacity is such as to be able to record the maximum number bytes transmitted during a field flyback, i.e. around 700



bytes. At each new field flyback, a recording is made on the buffer memory **22** with the new binary codes received.

During the time interval between two  
5 successive fields, the contents of the buffer memory are to be processed in accordance with the characteristics of the inventive method, the latter being implemented by a microcontroller **40** MC whose signals command the elements assigned to the invention.  
10 The elements assigned to the implementation of the invention are, in addition to the microcontroller **40** MC and the buffer memory **22**, a memory **28** (the second memory mentioned above) referred to as the MODIFIED SUMMARY memory, and a memory **34** (the third memory  
15 mentioned above) which forms the memory for displaying the guide on the screen **14** of the TV set, via a display circuit **42**.

The device in accordance with the invention also comprises electronic transfer gates **26** and **32** for  
20 the transfer from the buffer memory **22** to memory **28** and memory **34**, and comparators **24** and **30** which compare some of the codes contained in the buffer memory with corresponding codes contained in memories **18** and **28** as the case arises. The signals supplied by these  
25 comparators **24** and **30** respectively command the opening or the closing of the electronic gates **26** and **32**.  
It is to be noted that comparators **24** and **30** can be implemented in software form using a sub-program of the microcontroller **40** MC, in which case the electronic  
30 gates **26** and **32** are controlled by the microcontroller. When the microcontroller detects an EPG guide SUMMARY in the buffer memory **22**, it compares (comparator **24**)

each CNI code with those contained in memory **18**. In case of identity of contents, the CNI code of the channel whose signal is received by the TV set is recorded in the second memory **28**, schematically via the electronic gates **26** whose opening is controlled by the signal indicating identity at the comparator **24**. This CNI code is accompanied by the pair of ID numbers of the first and last data blocks allocated to CONTENTS for the channel identified by the CNI code.

10 In the absence of identity, i.e. when the channel is not received, the CNI code corresponding to that channel and the pair of ID numbers of the first and last data blocks of CONTENTS are not transferred into memory **28**. Further to this operation, after the EPG guide SUMMARY has been received, memory **28** will only contain the CNI codes and the pairs of ID numbers of the data blocks corresponding to channels whose signals can be detected by the TV set, i.e. those listed in memory **18**. As a result, memory **28** contains a MODIFIED SUMMARY.

25 After having received the EPG guide SUMMARY, the TV set receives the guide CONTENTS in the form of data blocks identified by the ID numbers. These data blocks are recorded with their ID number in the buffer memory **22** as and when they are received field after field. After recording one or several data blocks corresponding to a field flyback, each data block ID number is compared in comparator **30** to the series of numbers of data blocks of the MODIFIED SUMMARY contained in memory **28**.

In case of identity, comparator **30** supplies a signal that opens electronic gates **32** to transfer the

data block from the buffer memory **22** to the memory **34**  
where it is assigned to the channel to which it  
corresponds, for example by associating it to the CNI  
code, as indicated by arrow **44** between memory **28** and  
5 memory **34**. In the absence of identity between the  
number of a data block contained in the buffer memory  
**22** and one of the numbers of the series of numbers of  
the data blocks, the transfer of the data block to the  
memory **34** does not take place. These operations of  
10 comparing and transferring to memory **34** are performed  
under control of the microcontroller **40**, the  
comparisons possibly being performed by the  
microcontroller as indicated above.

When all the EPG guide has been received and  
15 processed in accordance with the above description,  
memory **34** only contains program data concerning the  
channels identified by their CNI code recorded in  
memory **18**, i.e. those which can be received. The data  
blocks contained in memory **34** can then be processed  
20 using programs and algorithms implemented in a known  
way by the controller **40** at the viewer's request using  
a remote controller **46** cooperating with a receiver **48**  
on the TV set **14**. After processing, e.g. for  
obtaining films at a given date, the sorted information  
25 is presented on the screen of the TV set **14** via a  
display circuit **42** which is also controlled by the  
microcontroller **40**. For clarity, Fig.1 does not show  
the functional links from the controller **40** to the  
other elements of the device.

30 The description just given of the device in  
accordance with the invention and its operation makes  
it possible to define the different steps of a process

which comprises two parts or main stages, the first one comprising the steps of processing the SUMMARY and the second comprising the steps of processing the CONTENTS.

For processing the SUMMARY, the steps include  
5 (Fig.2): (a) recording (20) the SUMMARY or a part thereof in the buffer memory 22 at each field flyback, (b) comparing (24) a CNI code of the SUMMARY with the list of CNI codes contained in the first memory 18, (c)  
10 transferring (26) the received CNI code and the pairs of ID identification numbers of associated data blocks into the second memory 28 only in the case of identity so as to create a MODIFIED SUMMARY, and (d) returning to step (b) to process the following CNI code or to step (a) to record the SUMMARY.

15 For processing the CONTENTS, the steps include (Fig.3): (e) recording (20) at least one data block and its identification number ID in the buffer memory 22, (f) comparing (30) the identification number ID of the data block with the series defined by the  
20 pairs of identification numbers ID recorded in the second memory 28, (g) transferring the data block, its identification number as well as the corresponding CNI code into the third memory 34 only in case of identity, and (h) returning to step (f) to process the following  
25 identification number or to step (e) to record the data block(s) of the following field.

In Fig.2, step (b) has been represented as two sub-steps, one (b1) of reading a CNI code of the SUMMARY and the other (b2) of comparing that read code  
30 with the list of CNI codes contained in the first memory 18. In a similar way, in Fig.3, step (f) has been represented as two sub-steps, one (f1) of reading

an identification number ID of a data block contained in the buffer memory **22** and the other (f2) of comparing that number ID to the numbers of the series of data blocks defined by the SUMMARY.

5           The invention has been described in its application to a television receiver which comprises a circuit for automatically searching channels received and which supplies the CNI codes of the received channels into a memory **18**. It also applies to a case  
10 where, among the received channels, the viewer limits himself/herself to some of them - those that interest him/her. In this case, the viewer has the possibility of only keeping the CNI codes of the channels he/she selects by acting on memory **18** via the remote  
15 controller **46** and the microcontroller **40**. Such an approach also allows adaptation of the device of the invention to the size of the memory **34** by limiting the number of processed channels to 10, 20 or more channels.

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